

WHAT IS CLAIMED IS:

1. An exposure method comprising the steps of:
illuminating a pattern formed on a mask using
5 an illumination system that forms an effective light
source having a first part that includes only s-
polarized light and a second part that mixes s-
polarized light and p-polarized light; and
projecting, through a projection optical
10 system, light from the mask onto an object to be
exposed.

2. An exposure method according to claim 1,
wherein the first part has an annular shape in which
15 the s-polarized light polarizes in a tangential
direction of the annular shape.

3. An exposure method according to claim 2,
wherein the second part has a circular shape that is
20 located inside the first part.

4. An exposure method according to claim 2,
wherein the second part has an annular shape that is
located inside the first part.

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5. An exposure method according to claim 1, wherein light intensity of the second part is smaller than that of the first part.

5 6. An exposure method that uses an illumination system that forms a predetermined effective light source using light from a light source to illuminate a mask, and projects a pattern formed on the mask onto an object to be exposed via a projection optical system,
10 said exposure method comprising the steps of:

splitting the light into s-polarized light and p-polarized light; and

forming a first frequency component among frequency components of the effective light source by
15 inputting the s-polarized light into a surface approximately conjugate with a pupil of the projection optical system, and forming a second frequency component lower than the first frequency component by
inputting a mixture of the s-polarized light and p-
20 polarized light into the surface.

7. An exposure method according to claim 6, wherein said forming step is conducted at a side closer to the light source than an optical integrator provided
25 between the light source and the mask.

8. An exposure method that exposes a pattern formed on a mask onto an object via a projection optical system using light from a light source, said exposure method comprising the steps of:

5 splitting the light into s-polarized light and p-polarized light; and

 inputting the s-polarized light into a predetermined area of a pupil in the projection optical system, and inputting light that mixes the s-polarized
10 light and the p-polarized light inside the predetermined area of the pupil.

9. An exposure method that exposes a pattern formed on a mask onto an object via a projection
15 optical system using light from a light source, said exposure method comprising the steps of:

 splitting the light into s-polarized light and p-polarized light; and

 introducing the s-polarized light into a
20 first part around a center axis that passes through a center of a pupil, in a periphery around the pupil of the projection optical system, and a mixture of the s-polarized light and the p-polarized light into a second part other than the first part in the periphery around
25 the pupil, the first part being parallel to a periodic direction of the pattern.

10. An exposure method according to claim 9,
wherein said introducing step introduces the s-
polarized light into a third part around the center
axis and an axis orthogonal to the center axis in the
5 periphery around the pupil of the projection optical
system, and a mixture of the s-polarized light and the
p-polarized light into a fourth part other than the
third part.

10 11. An exposure method according to claim 9,
wherein the polarization direction is controlled so
that the desired pattern is resolved by s-polarization
light and the auxiliary pattern is prevented from
resolving by the light that mixes the s-polarization
15 light and the p-polarization light.

12. An exposure method that uses plural types of
light to project onto an object to be exposed through a
projection optical system, a mask that arranges a
20 desired pattern of an auxiliary pattern smaller than
the desired pattern so that the desired pattern is
resolved and the auxiliary pattern is prevented from
resolving, said exposure method comprising the step of
forming a predetermined effective light source by
25 controlling a polarization direction.

13. An illumination system comprising a mechanism that forms an effective light source by inputting s-polarized light into a frequency component for resolving a fine pattern, and by inputting light that
5 mixes the s-polarization light and p-polarization light into a frequency component that resolves a pattern other than the fine pattern.

14. An illumination system comprising an
10 effective light source that includes a first part that includes only s-polarized light, and a second part that mixes the s-polarized light and p-polarized light.

15. An exposure apparatus comprising an exposure
15 mode that may execute an exposure method that includes the steps of illuminating a pattern formed on a mask using an illumination system that forms an effective light source having a first part that includes only s-polarized light and a second part that mixes s-
20 polarized light and p-polarized light, and projecting light from the mask onto an object to be exposed through a projection optical system.

16. An exposure apparatus comprising:
25 an illumination optical system that has an effective light source that includes a first part that

includes only s-polarized light, and a second part that mixes the s-polarized light and p-polarized light; and

a projection optical system that uses the effective light source formed by said illumination

5 optical system to project a pattern formed on a reticle or mask onto an object to be exposed.

17. A device fabricating method comprising the steps of:

10 exposing an object using an exposure apparatus; and

performing a predetermined process for the object that has been exposed,

wherein the exposure apparatus includes:

15 an illumination optical system that has an effective light source that includes a first part that includes only s-polarized light, and a second part that mixes the s-polarized light and p-polarized light; and

a projection optical system that uses the
20 effective light source formed by said illumination optical system to project a pattern formed on a reticle or mask onto an object to be exposed.